

Temporal Variability of Ion Acceleration and Abundances in Solar Flares

Solar flares accelerate both ions and electrons to high energies, and their X-ray and gamma-ray signatures not only probe the relationship between their respective acceleration, but also allow for the measurement of accelerated and ambient abundances. RHESSI observations have shown a striking close linear correlation of gamma-ray line fluence from accelerated ions $>\sim 20$ MeV and bremsstrahlung emission from relativistic accelerated electrons >300 keV, when integrated over complete flares, suggesting a common acceleration mechanism. SMM/GRS observations, however, show a weaker correlation, and this discrepancy might be associated with previously observed electron-rich episodes within flares and/or temporal variability of gamma-ray line fluxes over the course of flares. We use the latest RHESSI gamma-ray analysis techniques to study the temporal behavior of the RHESSI flares, and determine what changes can be attributed to an evolving acceleration mechanism or to evolving abundances. We also discuss possible explanations for changing abundances.